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10/002,447

10/26/2001

Timothy J. Dalton

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02/27/2003

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EXAMINER

LEWIS, MONICA

ART UNIT

PAPER NUMBER

2822

DATE MAILED: 02/27/2003

6

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/002,447

Applicant(s)

DALTON ET AL.

Examiner

Monica Lewis

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 09 December 2002.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-9 and 18 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-9 and 18 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 26 October 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

1. This action is in response to the amendment filed December 9, 2002.

Response to Arguments

2. Applicant's arguments with respect to claims 1-9 and 18 have been considered but are moot in view of the new ground(s) of rejection.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 1 and 3 are rejected under 35 U.S.C. 103(a) as obvious over Agarwala et al. (U.S. Patent No. 6,033,939) in view of *Electronic Packaging and Interconnection Handbook* by Charles A. Harper.

In regards to claim 1, Agarwala et al. ("Agarwala") discloses the following:

a) an organic material (5) encapsulated underneath said conductive layer (See Column 7 Lines 5-23)

b) the fuse structure is blown open by application of a beam of laser energy thereto (See Column 1 Lines 23 and 24).

In regards to claim 1, Agarwala fails to disclose the following:

a) a conductive layer.

Although Agarwala does not specifically state that (10) is a conductive layer and a top view of Figure 4 is not shown, it is well known in the art to use conductive layers with solder

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balls and conductive lines as shown in Harper (See Page 10.36 Figure 10.35). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the semiconductor device of Agarwala to include the metal traces as disclosed in Harper because they aid in establishing electrical communication (See Page 10.36 Figure 10.35).

Additionally, since Agarwala and Harper are both from the same field of endeavor, the purpose disclosed by Harper would have been recognized in the pertinent art of Agarwala.

In regards to claim 3, Agarwala discloses the following:

a) organic material is selected from a group that includes a polyimide, a polyamide, a polyarylene ether, a polyaromatic hydrocarbon (PAH), and a conductive polyaniline (Column 7 Lines 5-23).

5. Claims 2, 4 and 6 are rejected under 35 U.S.C. 103(a) as obvious over Agarwala et al. (U.S. Patent No. 6,033,939) in view of *Electronic Packaging and Interconnection Handbook* by Charles A. Harper and Stamper (U.S. Patent No. 6,111,301).

In regards to claim 2, Agarwala fails to disclose the following:

a) a liner material in electrical contact with said wiring segments and said conductive layer, said liner material further encapsulating said organic material between said wiring layer and said conductive layer.

However, Stamper discloses the use of liners (See Column 2 Lines 45-65). It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the semiconductor device of Agarwala to include the use of liners as disclosed in Stamper because it is resistant to corrosion and aids in separating the wiring (See Column 2 Lines 45-65).

Additionally, since Agarwala and Stamper are both from the same field of endeavor, the purpose disclosed by Stamper would have been recognized in the pertinent art of Agarwala.

In regards to claim 4, Agarwala fails to disclose the following:

a) liner material is selected from a group that includes TaN, Ta, TiN, Ti, W, WN, TaSiN, TiSiN, or alloys therefrom.

However, Stamper discloses the use of liners (See Column 2 Lines 45-65). It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the semiconductor device of Agarwala to include the use of liners as disclosed in Stamper because it is resistant to corrosion and aids in separating the wiring (See Column 2 Lines 45-65).

Additionally, since Agarwala and Stamper are both from the same field of endeavor, the purpose disclosed by Stamper would have been recognized in the pertinent art of Agarwala.

In regards to claim 6, Agarwala discloses the following:

a) a pair of vias (9) formed within an insulating layer (6) and extending down to said wiring segments (See Figure 4); and

b) a mesa region of said insulating layer formed between said pair of vias (See Figure 4).

In regards to claim 6, Agarwala fails to disclose the following:

a) liner material is formed upon sides of said mesa region and said wiring segments.

However, Stamper discloses the use of liners (See Column 2 Lines 45-65). It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the semiconductor device of Agarwala to include the use of liners as disclosed in Stamper because it is resistant to corrosion and aids in separating the wiring (See Column 2 Lines 45-65).

Additionally, since Agarwala and Stamper are both from the same field of endeavor, the purpose disclosed by Stamper would have been recognized in the pertinent art of Agarwala.

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6. Claim 5 is rejected under 35 U.S.C. 103(a) as obvious over Agarwala et al. (U.S. Patent No. 6,033,939) in view of *Electronic Packaging and Interconnection Handbook* by Charles A. Harper and Lee et al. (U.S. Patent No. 6,300,233).

In regards to claim 5, Agarwala fails to disclose the following:

a) conductive layer is selected from a group that includes TaN, Ta, TiN, Ti, W, WN, TaSiN, TiSiN, or alloys therefrom (See Column 3 Lines 43 and 44).

However, Lee discloses the use of TiN and W (See Column 3 Lines 43 and 44 and Column 4 Lines 33-40). It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the semiconductor device of Agarwala to include the use TiN or W as disclosed in Lee because it provides dense physical properties (See Column 4 Lines 53-56).

Additionally, since Agarwala and Lee are both from the same field of endeavor, the purpose disclosed by Lee would have been recognized in the pertinent art of Agarwala.

7. Claims 7-9 and 18 are rejected under 35 U.S.C. 103(a) as obvious over Agarwala et al. (U.S. Patent No. 6,033,939) in view of *Electronic Packaging and Interconnection Handbook* by Charles A. Harper, Stamper (U.S. Patent No. 6,111,301) and DiStefano et al. (U.S. Patent No. 5,590,460).

In regards to claim 7, Agarwala fails to disclose the following:

a) pair of vias is filled with said organic material.

However, DiStefano et al. ("DiStefano") discloses the use of organic material in vias (See Column 13 Lines 4-13). It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the semiconductor device of Agarwala to include the use

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of organic material as disclosed in DiStefano because it remains solid at temperatures below the activation temperature (See Column 13 Lines 4-13).

Additionally, since Agarwala and DiStefano are both from the same field of endeavor, the purpose disclosed by DiStefano would have been recognized in the pertinent art of Agarwala.

In regards to claim 8, Agarwala discloses the following:

a) organic material further occupies an inner area of the fuse structure, said inner area between the top of said mesa region and said conductive layer (See Figure 4).

In regards to claim 9, Agarwala discloses the following:

a) organic material (See Column 7 Lines 5-23).

In regards to claim 9, Agarwala fails to disclose the following:

a) conductive layer covers said inner area, thereby completing said conductive path.

Although Agarwala does not specifically state that (10) is a conductive layer and a top view of Figure 4 is not shown, it is well known in the art to use conductive layers with solder balls and conductive lines as shown in Harper (See Figure 10.35). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the semiconductor device of Agarwala to include the metal traces as disclosed in Harper because they aid in establishing electrical communication (See Figure 10.35).

Additionally, since Agarwala and Harper are both from the same field of endeavor, the purpose disclosed by Harper would have been recognized in the pertinent art of Agarwala.

In regards to claim 18, Agarwala discloses the following:

a) an electrically conductive organic material (5), said electrically conductive material completing a conductive path between wiring segments included in a wiring layer (See Figure 4);

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b) a pair of vias formed within an insulating layer, said pair of vias extending down to said wiring segments (See Figure 4); and

c) the fuse structure is blown open by application of a beam of laser energy to said electrically conductive material (See Column 1 Lines 23 and 24).

In regards to claim 18, Agarwala fails to disclose the following:

a) an organic material filling the vias.

However, DiStefano discloses the use of organic material in vias (See Column 13 Lines 4-13). It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the semiconductor device of Agarwala to include the use of organic material as disclosed in DiStefano because it remains solid at temperatures below the activation temperature (See Column 13 Lines 4-13).

Additionally, since Agarwala and DiStefano are both from the same field of endeavor, the purpose disclosed by DiStefano would have been recognized in the pertinent art of Agarwala.

Conclusion

8. The following prior art made of record and not relied upon is considered pertinent to applicant's disclosure: a) Giust et al. (U.S. Patent No. 6,259,146) discloses a semiconductor fuse structure.

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Monica Lewis whose telephone number is 703-305-3743.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Amir Zarabian can be reached on 703-308-4905. The fax phone number for the organization where this application or proceeding is assigned is 703-308-7722 for regular and after final

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communications. Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.

ML

February 12, 2003



AMIR ZARABIAN
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